Aquaculture in Alberta

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Circle M Trout Farm ... near St. Paul

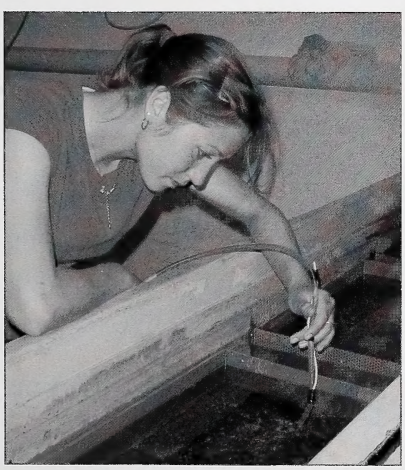
Doug and Virginia Millar have been in the trout farming business for more than 20 years. In the early 1980's they first became involved by brokering trout fingerlings from outside the Province. Doug soon decided it was time to build his own fish farm and began raising trout, from the egg stage, for stocking ponds. The aquaculture operation is an integral part of the family's farming business, named Circle M Trout Farm.

Doug says, "Graduating from the University of Alberta with a degree in animal nutrition, I always knew I'd be a farmer, but I never dreamed it would be farming fish." Each year, many of the rainbow trout grown at Circle M are raised to stock public water bodies, under contract. The Millars also sell fishing-ready trout to the private sector for stocking nearby farm dugouts, ponds and urban community reservoirs.

How much work does it take? "Well," according to Doug, "a lot of patience, learning the hard way and daily diligence is necessary. We buy our rainbow trout eggs from a certified USA supplier in late summer, just to grow stockable trout by early the next summer."

The Millar's Circle M Trout Farm and aquaponics greenhouse is located between St. Paul and Elk Point.

Doug and Virginia's daughters are beginning to take an active role in the family fish business, particularly since an aquaponics greenhouse was added on four years ago. The

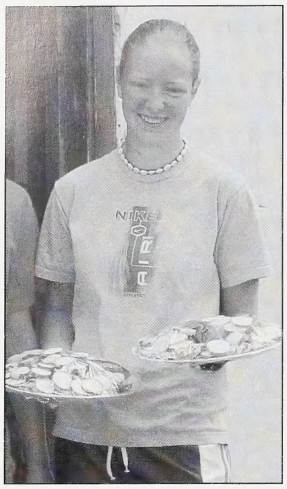


Vanessa Tarkowski, summer assistant at Circle M carefully picking through trout eggs.

"We then cross our fingers that the trout hatch and survive well...that the backup generator goes on when the power cuts out...and finally, that our customers have good water quality in their ponds. And what is our busy season? Well, it seems to coincide with spring farming. So I start my calving in early March, grow low maintenance crops, and have a hired hand. When May fish deliveries roll around, all the major farm activities are completed." "Actually," says Doug "working around my children's track and field schedule has been the hardest issue lately."

Features

Alberta
AGRICULTURE, FOOD AND RURAL DEVELOPMENT

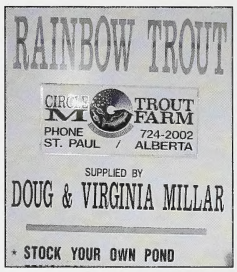


Amy, the eldest Millar daughter, holding aquaponically grown cucumbers.

Millar's venture into aquaponics is showing good potential. The greenhouse is producing market quantities of delicious tomatoes and cucumbers from early spring to fall. Plants grow on floating foam sheets, their roots taking in nutrients from the fish water.

No pesticides or major fertilizers are used. Circle M's aquaponics has a different twist from most aquaponics systems. Although nutrient rich fish water feeds the plants, it is not allowed to recirculate back to the fish system. "This is important," notes Doug "because with trout farms the water is too cold to successfully grow anything but lettuce. Our aquaponics water circulates from the fish effluent tank to the plant troughs and then returns to the effluent tank. Water gets heated indirectly through the greenhouse to warmer climate crops like tomatoes."

Joanne Paul, a student and neighbor, hired to manage aquaponics during summer.



Doug has been active in organizing aquaculture interests in Alberta. He has been past president of the Alberta Fish Farmers Association, dedicating considerable time on provincial and federal fish farm issues. Currently, Doug is a director of this association, representing their interests in the Aquaculture Centre of Excellence. Doug also lends a hand with provincial aquaculture courses, his background in nutrition and feeds is a bonus.

Is Coal Heating For Your Fish Farm an Option?

As with any commercial farming venture, increases in energy consumption took its toll on profits during the last couple of years. One option is to raise prices for fingerling fish. However, we all know how consumers feel about price increases, which seems to have no immediate resolution to cash shortage issues. What can fish farmers do?

In Alberta, two commercial fish farms have already changed to alternate heating. One coal-burning furnace (300,000 to 400,000 BTU) now serves as the main heating source for the work buildings. Initial reaction from the owners is that purchase costs are manageable and routine maintenance is not an issue.

What about the cost? Although a number of makes and models are available; most small-scale domestics are around $10,000 including the heating pipes. Add another couple of thousand for a cement pad and self-loading bin. These furnaces are made to last many years (ten year guarantees are possible).

So, how much can you save? In the past, average sized Alberta commercial fish farmers anticipated heating bills of around $2,000 for a full season. Now, with soaring costs, there have been occasions when winter heating bills reached nearly $2,000 a month. Coal costs about $30 a tonne. If one Alberta fish farmer used 40 tonnes of coal last year, the saving is great. If you're hedging that the heating costs will remain the same for two to three full years, then the coal burner will pay for itself. As Mark McNaughton of MDM Aquafarms says, "Our bottom line is coal heating costs us under $2.00 per gigajoule. Gas would have been twice that!"

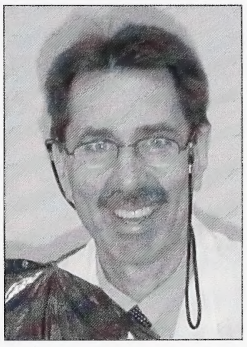
Oh ... To Prepare a Proper Fish Plate!

By Charles Parker, Head Chef
Lethbridge Community College, Culinary Arts

What do you look for in a quality fish product? If it is fresh, then look at the skin... it should be shiny and still brightly colored. The flesh should have a mild odor and be firm, or elastic to the touch, that is, when you press down on the meat, then take your fingers off, the flesh should bounce back to its original shape.

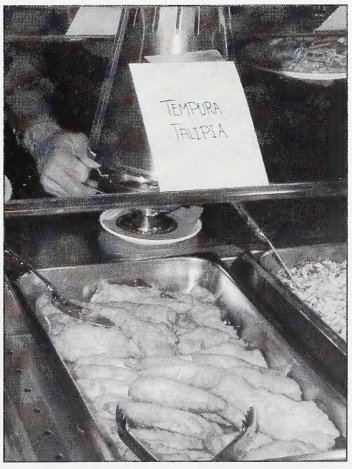
If the meat has a strong fishy smell, rib bones are separating from the body cavity or the flesh stays indented when pushed in, the fish is not in a fresh condition for eating. If the head's still on, then look at the fish's eyes. They should not be sunken in, unless the product has been previously frozen or on the shelf too long. If it has been frozen, check for discolored spots or areas, indicating freezer burn. There should be no frost or loose ice crystals in the package. The worst you can do is to prepare and then let someone eat fish that is not of high edible quality.

Mr. Parker says, "I eat fish two or three times a week, high in omega 3's and low in the fats that we don't need." As a rule, cook your fish 5 minutes per inch of flesh, either by baking, broiling or microwaving or on the barbeque or frying pan.



When the flesh is opaque, and flakes easily, it is done. The trick is ensuring the flesh is well done, but not overdone, flaking off the bones and moist, but still solid. What about freezing? Not a problem as long as it is not frozen too long. With proper storage and sealing, either with quick freezing, dipping in ice water, cryovac bags, etc., lean fish can be kept up to six months.

Charles notes, "Once your fresh fish has been prepared, either as a boneless fillet or steak, do not rinse the exposed fish under running water, this simply washes away the flavor. If you prefer a less pungent fish flavor when eating, consider topping your finished fish product with a nice fresh tomato herb sauce or light cheese sauce. Both can make fish more appealing to your family or dinner guests."



Remember, it is best to eat your fish fresh. However, if you know you cannot eat your fresh fish within the next two to three days, then consider freezing or smoking your fish product.

Wetlands and Aquaculture – Can Work Together

When Dan Menard planned his trout farm in 2002, he thought about running nutrient rich wastewater from his indoor fish rearing system to an outside pond. Dan wanted to design a constructed wetland that would use Mother Nature to help clean the water. As Dan's farm uses only well water, any recycling of water supply provides long-term insurance.

Where did Dan find out about constructing wetlands? Dan's first call was to the Federal Prairie Farm Rehabilitation Administration (PFRA) in Red Deer. The local water engineer provided Dan with designs and specifications to make a wetland work. The Menard's wetland was completed in spring of 2003; now the cattails and vegetation are thriving.

Max Menard, of Smoky Trout Farm near Red Deer, standing tall next to their constructed wetlands and a healthy stand of cattails. The wetlands have only been functioning for a year.

How do wetlands work? Wetlands are areas of land often saturated by surface or groundwater, enough to support the growth of water-loving plants. Wetlands act in combination with vegetation, soil, water and microorganisms that act as waste purifiers for the water. Plants slow the water flow through the system, creating adequate retention time for treatment and help by absorbing some of the contaminants.

Sandi Riemersma of AAFRD, testing cleansing capabilities of wetlands at a southern Alberta cattle feedlot.

Microorganisms living on the vegetation eliminate most nutrients by transforming them into body tissue and less harmful chemicals. Phosphorus and bacteria also end up being bound to wetland soils and buried by inflowing sediment and dead plant matter. Sunlight helps remove bacteria, through ultraviolet radiation.

Designing a wetland

According to Sandi Riemersma, surface water quality specialist with Alberta Agriculture, Food & Rural Development (AAFRD) "When constructing wetlands, farmers need to consider: quality of the water to be treated, end use of treated water, slope of the land, type of vegetation/soil, and local climate. It is important that location of the constructed wetland does not negatively impact groundwater or surface water."

Alberta's recirculating aquaculture facilities generate low volumes of wastewater (about a toilet flush every few hours). Thus, the size of wetland should be relatively small. The holding capacity should be able to handle at least twelve days of flowing water. To keep aquatic vegetation thriving, maintain water levels a minimum 30 cm depth.

Two fish farms in Alberta are using wetlands to help clean up their effluent. Results will vary among systems; one facility (Greenview Aquafarms) showed suspended solid reductions to nearly 75%, with phosphorus and organic matter levels being reduced to nearly 50%. Greenview's wetland system is very simple, relying mostly on settling out and solar irradiation.

What about assistance with wetlands? Well, you could contact the Province's (AAFRD) nearest agriculture water specialist or see a local Federal PFRA office for information on design and construction. It wouldn't hurt to ask if there is any funding assistance available, possibly through environmental farm stewardship programs.

Trout Pond Craziness

Who'd ever think a backyard dugout could be fashioned into an ideal fishing spot for trout, complete with swimming hole and waterslide ... keeping the family, friends and neighbours happy all summer? Well, Randy Ehman of High Prairie had the vision. "Why travel many miles away, when all three adventures can be found in your own backyard."

The Ehman's trout ponds and waterslide are located south west of High Prairie.

Catching rainbow trout is not a problem most days, be it on flies or spinners. For those wishing to barbeque their fine tasting catch, there's a fire pit on the sandy beach, right next to the shore. "Some people prefer just to feed the fish," says Randy. "Watch out, though" he notes "as instantly the water surface is turned into a frenzy of fish fins and splashes."

Solar jar with white light helps feed the fish and light up the pond at night.

And what about the homemade giant waterslide? It's set up on a 20-metre berm of soil left over from the original pond excavation. When a group of kids want to use the slide (made of poly liner) Randy just starts up the 3" Honda pump that propels water down the slide.

Randy has also figured out a novel way of helping his fish feed on insects around the pond. He converts solar patio lights to floating insect lures. The lights fit snug into plastic 4-litre jars, partially filled with sand. These "solar jars" float on the water surface, provide free night illumination to the pond and attract flying insects down to the water's edge for a quick trout meal. Randy points out, though, "If you're going to get solar lights, buy ones that produce a white light not an amber color."

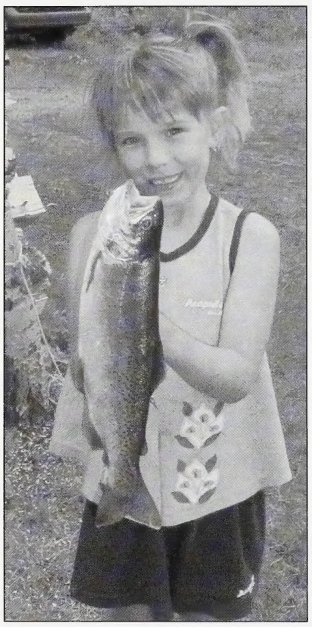
The Ehman's don't mind sharing their "envious" facilities, hosting many community get-togethers on the property. Recently, 80 neighbors attended a "Redneck" barbeque, heavily testing out the ponds and fishing. Randy says, "I'm so impressed how my trout grow so fast and taste so good, I sometimes think I should try my hand at commercial fish farming... either by U-fish or growing table ready fish for our local food market." Randy attributes his fish success directly to high water quality through continuous electrical aeration.

A fine rainbow taken by a friend, just learning the art of fly-fishing.

Muddy Flavoured Fish

Muddy flavour is defined as a tainted earthy or musty taste in fish flesh caused by one of two chemicals, *geosmin* or *2-methylisoborneal.* Both are produced by cyanobacteria (blue-green algae) or mould-like, filamentous bacteria (called actinomycetes). These water borne organisms release the muddy tasting chemicals, taken up by fish through their gills, as well as through their digestive tract.

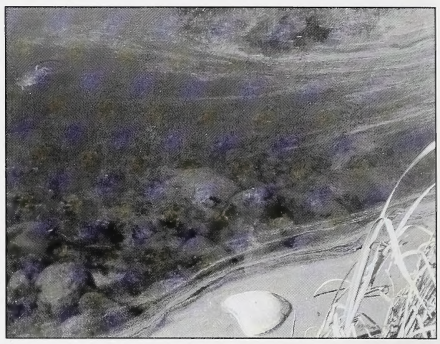
This off-flavour is often associated with periods of high water temperatures and heavy nutrient loading. Warmer summer months are ideal for producing heavy growth of blue-green algae and actinomycetes.



Off-flavour can occur in some ponds during all months of the year. Although not a health hazard, *geosmin* becomes absorbed in fish tissue, making the fish taste bad or dirty; fishermen stop fishing, commercial aquaculturists quit selling and consumers switch to another protein supply. If tainted fish reach the market, they have the potential to ruin the reputation of the species and the full potential for the industry.

Geosmin is a Greek word meaning "smells like dirt" and is a major cause of off-flavour in fish from Alberta's ponds and lakes. It's an extremely potent compound, with minute concentrations (measured in parts per trillion) creating the well-known soil or woody odor. Less than one drop of pure *geosmin* in an average half-acre Alberta farm pond is enough to give the water an earthy taste. Foods such as beets also contain concentrations of *geosmin*.

Although exact cause of this off-flavour is not well understood, poor water quality and pond bottom conditions coupled with fish feeding habits may combine to increase this off-flavour. What can you do? Generally, one cannot change the water quality or bottom conditions of a pond or lake. Neither can you usually harvest fish alive and relocate them to clean, cool water for a few days (purging). You are then limited to only a few potentials that might improve water quality or consider harvesting your fish in cold weather months.



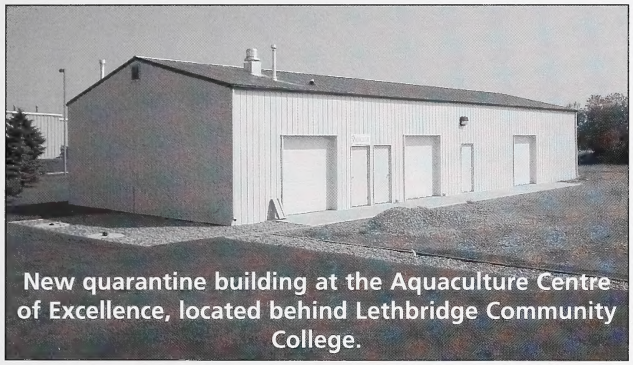
First, consider pond aeration. A healthy pond needs good aeration to allow beneficial microbes and bacteria to thrive (reducing anaerobic fouling.) Eliminate contamination with chemical fertilizers; farm runoff, fallen leaves and other organics that contribute to sludge build up.

Consider taste-testing your fish regularly. Microwave a small section of fish for about a minute; then eat. If the flesh tastes muddy, don't harvest but test again the following week. This gives you a good indication on how often your fish are muddy flavoured. If you plan to net out all your trout, delay harvest until positive the muddy flavour is gone (the winter months).

Chemical application is another option, adding copper sulfate to the water. This product is effective for algae control, when used according to label recommendations (for fish). By eliminating the blue-green algae, *geosmin* is not produced and the associated taste and odor problems are reduced or end.

Alberta's Aquaculture Industry Update

Activities - The Aquaculture Centre of Excellence (new logo above) is located in Lethbridge and enjoying its first complete season of business. There is research being done on diseases, silver carp, grass carp spawning, Blackwater trout in alkaline water, aquaponics and equipment performance.



New quarantine building at the Aquaculture Centre of Excellence, located behind Lethbridge Community College.

Facilities at ACE include a lecture area, two quarantine rooms, molecular disease lab, state-of-the-art full sized recirculating aquaculture system, an isolation unit and two greenhouses (one for aquaponics; the second smaller greenhouse is currently contracted out for testing pond treatment products).

Most of the research at ACE is through collaboration with Alberta Agriculture and the Alberta Fish Farmers Association. Other government agencies and private industry have initiated research at ACE.

For more information about the Aquaculture Centre of Excellence, including tours, contact ACE at 403 317-3531 or Clay Boyes (cell 403 308-6214).

Trout Stocking Update - If you are a licenced fingerling trout supplier, a bid package will be sent out to you in early October 2004 on contracting out your rainbow trout for public water body stocking. These contracts are effective for the 2006 stocking season. Bidders have approximately one month to send bids back to the ACA.

A total of 10 contracts will be up for bids, each requiring between 10,000 to 14,000 20-cm rainbow trout. Contractors are allowed to hold only 3 contracts maximum, but are welcomed to bid on all 10. Most contracts are for water bodies located south of Edmonton to the USA border and east to the Saskatchewan border. Contact Trevor Council of ACA at 403 382-4354.

Fish Culture Licencing

Alberta's Aquaculture Section has 3700 current fish culture licence holders for 2004. This includes 3600 licences for recreational ponds and 100 commercial aquaculture licences. This number is stable with the year before.

Alberta Aquaculture Association

The Alberta Fish Farmers Association held its 2004 annual meeting in Red Deer, on March 27. A new Board of Directors was elected, including: Lorne Louden - president, Curt McNaughton - vice president, Victoria Page/Dan Menard - secretary/treasurer, and three directors: John Fletcher, Sandy McLean and Doug Millar.

The membership agreed to change its name to the Alberta Aquaculture Association (AAA) and move its annual general meeting to the fall when fish culturists are able to commit more time. The 2004 general meeting is planned for November 19 and 20 in Leduc. For more information, contact your local AAA director or visit the web page www. affa.ab.ca

"Raising Fish in Your Dugout or Pond" seminars were successful at all six Alberta locations, with courses planned again this coming February. The "Association" also set up booths at the annual Alberta Fish and Game convention and at two acreage days' workshops, near Edmonton.

Lorne Louden, President

Many visitors toured the booth during Acreage Days, near Devon, where they learned all about stocking fish.

COURSES, PUBLICATIONS & EVENTS

Courses

Alberta Agriculture will offer two aquaculture courses this winter.

The first course, "Raising Fish in Your Pond" is offered during February and planned for various Alberta locations. "Raising Fish" is a three-hour evening course sponsored by the Alberta Aquaculture Association.

The second course is "Basic Principles of Aquaculture." This cooperative course will be held in Red Deer during mid-March of 2005. This is a two-day intensive course including numerous guest speakers and tours of nearby fish farms.

To obtain more information on these courses contact: Eric Hutchings, of AAFRD's Aquaculture Section in Lethbridge, toll free by dialling 310-0000, then 381-5574 or dial direct with area code (403) 381-5574.

Publications

A selection of aquaculture fact sheets, publications and videos are available on a short-term loan through the Aquaculture Section in Lethbridge. The contact person is Judy Chow at (403) 381-5170.

The following government publications are also available on Internet (Ropin' the Web) or by calling AAFRD's Publications Branch (1-800-292-5697):

ACE reports no triploid grass carp will be available for public sale in the 2005 summer season. Due to unexpected mortalities in the incubation of fry, many of the juvenile fish were lost. Plans are underway to ensure high survivorship for the next year.

Aeration of Dugouts or Ponds with Compressed Air. Agdex 716 (B36)

Algae Control in Ponds. Agdex 485/716-2

Biological Weed Control in Alberta Using Triploid Grass Carp. Agdex 485/641-1

Constructing Dugouts for Fish. Agdex 485/716-1

Fish Culture Licences. Agdex 485/84-1

Freshwater Aquaculture Industry. Ag -Venture series Agdex 485/830-1

Predator Damage Control. Agdex 485/685-1

Screening Your Fish Pond. Agdex 485/87-1

Feeding the Fish in Your Dugout or Pond. FS485/50-1

Events

October 17 - 20, 2004, Aquaculture Canada 2004, Quebec City. The theme is "*To Your Health! Farming Freshwater & the Seas.*" This is a comprehensive technical, industry-oriented program with special symposia and workshops on various sectors of the Canadian aquaculture industry. For information visit : www.aquacultureassociation.ca

October 19 - 22, AquaNet IV. 2004, Quebec City. AquaNet's annual general meeting and scientific conference. Here, members and interested parties acquire information on the progress of different aquaculture projects. There is continued networking through various activities (scientific presentations, workshops, group meetings, poster exhibition, special events, etc. See the web site http://www.aquanet.ca/

December 7 – 9, 2004, Northwest Fish Culture Conference 2004: New Challenges, New Opportunities, Victoria, British Columbia, Canada.
See www.nwfcc.confmanager.com

Editor's Notes

This will be the only issue of Aquaculture in Alberta produced for year 2004. If you would like to submit articles, provide us with input, or to be placed on the mailing list, contact the aquaculture section in Lethbridge at (403) 381-5170.

The Internet address for Alberta Agriculture, Food & Rural Development's "**Ropin' the Web**" Home Page is http://www.agric.gov.ab.ca/. The home page contains aquaculture information, accessed by first clicking on the feature "livestock" and then "aquaculture." Any information contained in this bulletin regarding commercial products may not be used for advertising or promotional purposes without permission from Alberta Agriculture, Food & Rural Development and is not to be construed as endorsement of any product or firm by Alberta Agriculture, Food & Rural Development.